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AUTHOR(S):

HAMABUCHI, MASANOBU; SHIMIZU, YOSHIHIKO

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Thoracoplasty with Marlex Mesh Following Total Resection of Sternum: A Case of Chondrosarcoma of Sternum

MASANOBU HAMABUCHI and YOSHIHIKO SHIMIZU*

Department of Orthopaedic Surgery Hyogo Prefectural Tsukaguchi Hospital

*Department of Artificial Organ Research Center for Biomedical Engineering, Kyoto University

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Summary

Removal of the whole sternum for malignant tumor results in a large defect, causing a severe deformity and possible paradoxical movement of the chest wall. Many of thoracoplasty cases after total sternectomy require considerably complicated invasion.

Recently, we performed on a patient with chondrosarcoma of the sternum total resection of the sternum including bilateral costal cartilage followed by thoracic reconstruction with polyethylene hard mesh (heavy Marlex mesh). In the present paper, we make a report of the case of thoracoplasty reliable to perform which has produced immediate chest wall stability without postoperative thoracic deformation.

Postoperative CT confirmed that the mesh is well infiltrated with fibrous granulation tissue which connected chest muscle. Impairment of respiratory function after the operation is not observed.

Case report

A 54-year-old woman was seen in our hospital for distended sternum with pain.

Lateral sternum tomography and CT findings revealed fusiform swelling of the sternum and irregularly thinned bone cortex with great destruction of the cortex in the lateral and the anterior area.

Shadow of the mottled tumor including spotted calcification was observed in the cancerous bone, which expanded across the destroyed cortex to the soft parts (Fig. 1) (Fig. 2). ^{99m}Tc-bone scintigraphy showed strong abnormal accumulations in each of the body and the manubrium of sternum.

Pathological examination was carried out. Chondroid formation was recognized. Chondroblasts were so atypical that some of them were multinuclea, some being large with a hyperchromatic nuclear, which led to a diagnosis of chondrosarcoma, grade 2 (Fig. 3).

[Surgery]

On January 26, 1989, the radical sternectomy was performed. The patient underwent an total resection of the sternum including bilateral costal cartilages which resulted in a huge defect of the anterior chest wall (Fig. 4). Reconstruction of the thorax was performed with woven polyethylene

Key words: Thoracoplasty, Marlex mesh, Chondrosarcoma, Sternum.

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Present address: M. HAMABUCHI, 661 Hyogo-Amagasaki Minami-Tsukaguchi, 6-8-17, Japan.

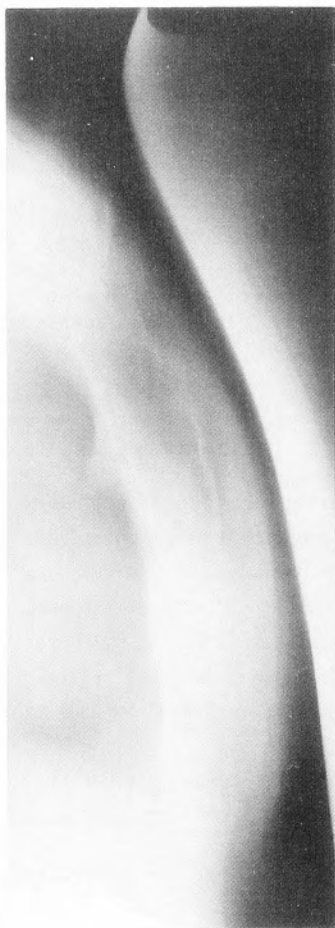


Fig. 1 Lateral sternum tomography revealed thinning and destruction of the bone cortex, ununiform transparent focus in the bone marrow with partical calcification.

hard mesh (heavy Marlex mesh®). That is, the Marlex mesh and costal resection site were sutured firmly, which was further covered with pectoralis major muscle to be sutured closely (Fig. 5).

Immediate chest wall stability was provided. Paradoxical movement of the chest was not observed. The patient has had good respiraotry condition since immediately after the operation. At the present time, two and a half year after the operation, she is leading a normal life. Post-operative CT shows granulation tissue formed in front and in rear of the mesh, connected with chest muscle. She has no thoracic deformation and her pulmonary function is not impaired.

Discussion

Chondrosarcoma frequently occurs in long bone and pelvic bone. DAHLIN et al. noted chondrosarcoma developed in the sternum in 19 cases out of 635 cases (3%).

With regard to prognosis of chondrosarcoma, O'NEAL et al. (1951) and EVANS et al. (1977) histologically classified patients into three groups in terms of the size of cells, atypia, cell division

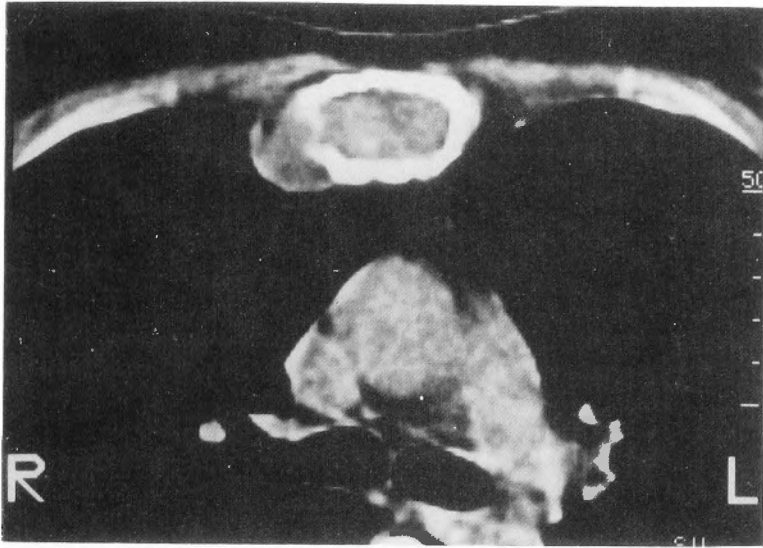


Fig. 2 CT findings provided irregularly thinned and destructed bone cortex and shadow of mottled tumor with spotted calcification.

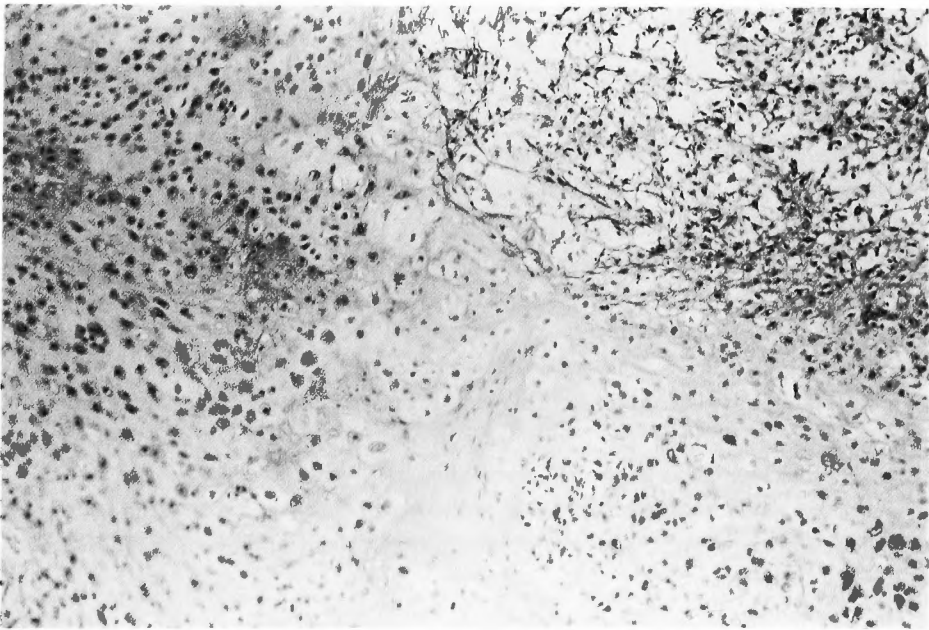


Fig. 3 Pathohistological examination. Chondroid formation was recognized. Chondroblasts were so atypical that some of them were multinuclear, some being large with a hyperchromatic nuclear.

rate, cellularity. They argued for correlation between pathohistological malignancy and prognosis.

O'NEAL et al. stated that since neither clinically nor histologically was it possible to differentiate benign thoracic chondromas from malignant ones with certainty, such cases should be considered malignant and radical resection be performed.



Fig. 4 The patient underwent an extensive resection of the body and the manubrium of the sternum including bilateral costal cartilage.

As total sternectomy results in a large defect, careful consideration should be given to subsequent repair of the thorax, not to cause a severe deformity and possible paradoxical movement of the chest wall. Already in 1909, GANGOLPHE employed metallic prosthesis. The method of obtaining support by bone transplantation of tibia or costa has also been used for a long time (KINSELLA et al. 1947, BISGARD et al. 1948).

Recently reported has been the employment of the muscle flap of pectoralis major muscle or the latissimus dorsi flap with ribs (BOBIN et al. 1988). Thoracoplasty using prosthesis such as acrylic resin (ALONSO-LEJ 1971), a silicone plate (SHEINFELD 1987), polyethylene mesh and metal bars (Larsson et al. 1984), has also been performed.

We employed a method of supplementing extensive defect with woven polyethylene hard mesh (heavy Marlex Mesh), firmly sutured it with the end of the resected costa; and closely covered with pectoralis major muscle. It has produced immediate chest wall stability. Post-operative CT shows granulation tissue formed in front and in rear of the mesh, connected with chest muscle. The patient has had good progress without post-operative thoracic deformation. Her pulmonary function is not impaired.

We are grateful to Dr. MEIJI OKAMURA, Pathology Division, Kansai Medical University Hospital, for the help with the histopathological diagnosis, and to Dr. YOSHIHIKO KOTOURA, Department of Orthopaedic Surgery, Kyoto University Hospital, for the clinical help.

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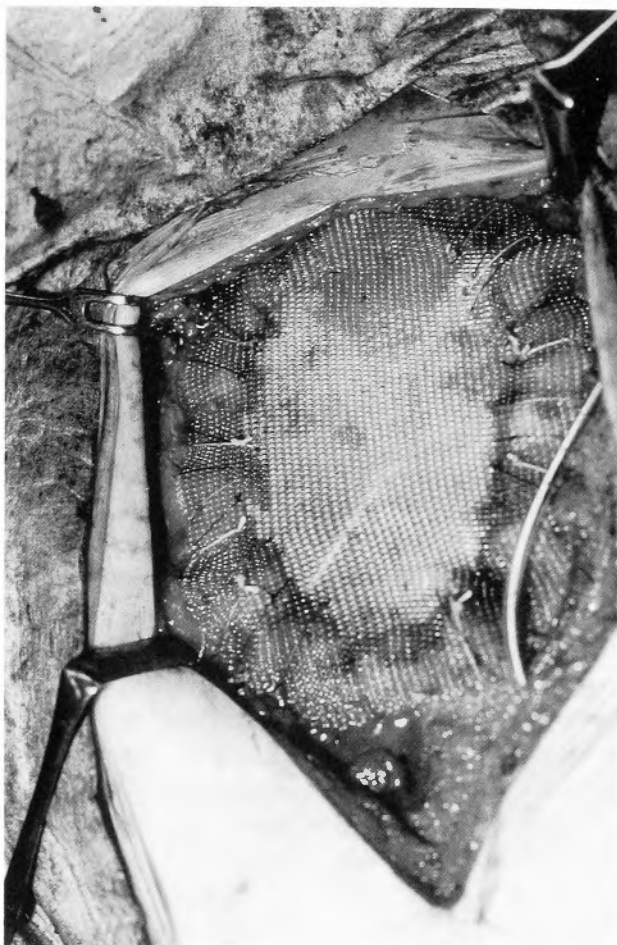


Fig. 5 Reconstruction of the thorax was performed with woven polyethylene hard mesh.

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和文抄録

胸骨全摘出後の人工材料 (Marlex mesh) を用いた
胸郭形成術について

兵庫県立塚口病院 整形外科

濱 淵 正 延

京都大学医用工学研究センター 人工臓器部門

清 水 慶 彦

悪性腫瘍等によって胸骨全摘出が行われる場合は肋軟骨も含めて切除されることが多く、その結果広範囲の胸郭欠損が生じ、重大な胸郭変形や胸壁の paradoxical movement の原因となることもある。

胸骨全摘出後の再建術には古くより種々の工夫がなされており、かなり複雑な侵襲を必要としている。

最近我々は胸骨軟骨肉腫に対して両側肋軟骨を含めた胸骨全摘出を行い、欠損部に対して人工材料を用いて胸郭再建術を行った症例を経験した。広範欠損部を woven polyethylene hard mesh (heavy marlex mesh®) で補い、肋骨切除端を強固に縫合し、大胸筋で密に被覆

する方法を行った。術直後より確実な胸壁の stability が得られ、呼吸状態は良好であった。術後の CT 像では線維性肉芽組織が mesh の前後を充てんし、大胸筋と一体化して生着している状態が認められた。術後2年半の現在、胸郭変形はなく、呼吸機能の低下も認められず良好に経過している。

胸骨全部摘出後の胸郭形成術では、筋肉皮弁や肋骨移植の利用、レジン板の使用等と比較して、Marlex mesh を使用した再建術は確実に良好な成績の得られる手術である。